# CS 447-002 Networks and Data Communications
# Spring 2024
# Quiz #4 on February 7, 2023 (SOLUTIONS)

## Your Last Three Digits: _____
(please do NOT write all of your student ID or your name)

## Grade: _____

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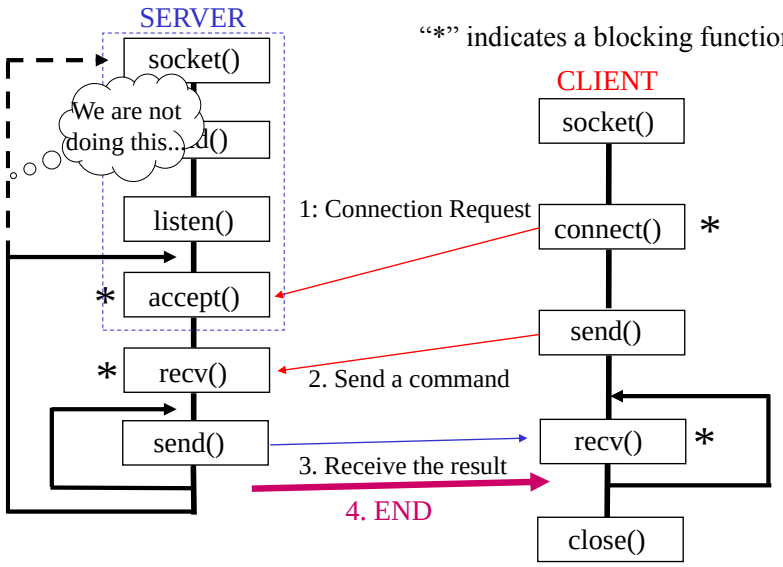
(1) What are "blocking functions"? Mention three socket APIs that are "blocking function".

Blocking functions are those functions (or APIs) which stops/holds a calling process at a function (does not let a calling process to proceed) until its expected activity(s)/task(s) complete(s)/fail(s).

blocking socket APIs: accept, connect, and recv

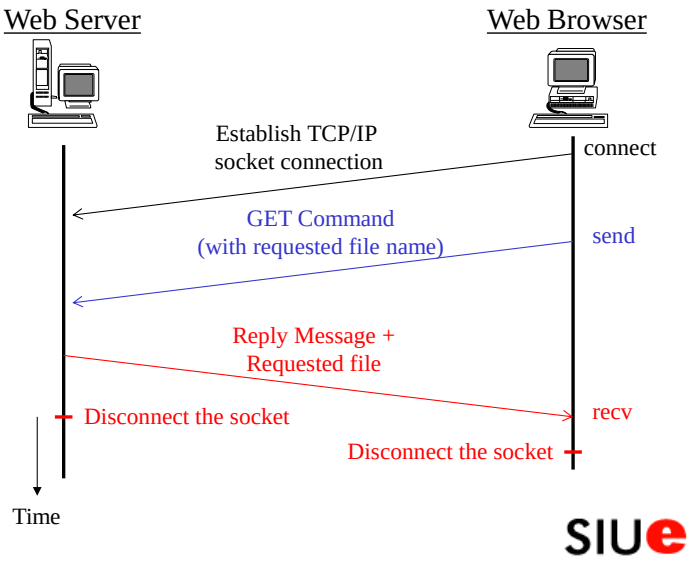
(2) Show the general socket API structure for network applications that are based on client and server mode. Show the messages exchanged between a server and a client.




(3) "accept" socket API duplicates a socket connection through another port at the server side as soon as a connection request from a client is established. Why (explain the purpose of doing it)?

It is for freeing the primary port for (multiple) other clients to establish a connection (i.e., to let other clients to contact a server process through the primary port).

(4) Show the message pattern expected for downloading a webpage using HTTP (assume that most of the websites consist of multiple other "component files".




(5) Explain why multiple threads are needed at a proxy for handling HTTP network traffic?

Since a proxy needs to handle network traffics in two directions (physically) at the same time (one for from a browser to a web server and another for from a web server to a web browser), which can not be performed at the same time using only one thread since "*recv*" is a blocking function (if a thread tries to handle S→C traffic, it blocks on the *recv* for S→C, making it impossible for the proxy to handle C→S traffic (since doing it requires own "*recv*") and vice versa.

**Note**: the underlined concept is needed for decent (or full) credit.